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Author(s):	Anaya, Lillian Marie Adkins, Kenneth Brian
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Los Alamos
NATIONAL LABORATORY

Operational and Mission Highlights

A MONTHLY SUMMARY OF TOP ACHIEVEMENTS

June 2021

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COMMUNITY RELATIONS

NUCLEAR SECURITY

Classified Library Celebrates Two-Year Anniversary, Vital to Laboratory Pit Production

On June 10, 2021, the Laboratory's National Security Research Center (NSRC) marked its second anniversary. The Laboratory has amassed millions of materials associated with nuclear weapons and national security — such materials date back to World War II. These collections have been brought together to form the NSRC, which is housed under the Weapons Physics (ALDX) directorate.

Already one of the top research institutions in the country, the NSRC contributes vital data to the Laboratory's pit production enterprise and its other national security work. Although the NSRC supports the Laboratory as a whole, particularly in Weapons and Global Security, it also serves the National Nuclear Security Administration and the Department of Energy.

Major Digital Sale Reveals Increase in Efficiency and Environmental Friendliness

On May 10, 2021, personnel submitted a sale of detonators to the document control records management system. Rather than make this submission through a previously used paper system, personnel for the first time submitted an electronic file sale. This digital sale — a process of handing to NNSA a product quality checked and approved by the Laboratory — consisted of 29,148 pages captured in a PDF. Previously, this massive document would have been printed, bound, and physically moved with the help of dollies.

Staff members in weapons production took advantage of this new electronic system to increase efficiency and environmental improvements associated with the sale process. The overall evolution of digital sales at the Laboratory began in 2015, when teams first started using PDF files and/or computer displays rather than paper. In 2018, new software was developed that supported the entire process without having to create PDF files; instead, data from production systems is strategically redisplayed to enable users to review and evaluate the data.

In the past, a typical sale took weeks or even months to execute. The new software and teams dedicated to the process now complete a sale data package in half a day — such efficiency does in no way sacrifice accuracy. This new process has established the groundwork for much smoother sales of products, such as detonators, NASA items, and ultimately plutonium pits. The process also reaps ongoing benefits for both the Laboratory and NNSA staff.

New "Quiet-Start" Method Resolves Longstanding Discrepancy in Simulations of HEDP Experiments

"Quiet start" prevents spurious (false or fake) interface motion in high-energy density physics (HEDP)/Inertial Confinement Fusion (ICF) simulations when materials are solid but have different pressures.

For cylindrical problems, typical simulations force pressure equilibrium between materials to avoid spurious interface motion. Nevertheless, this was the source of longstanding discrepancies between simulation and experiment when it came to shock speeds through foams.

By implementing the new cylindrical quiet-start method, Laboratory researchers can use accurate initial conditions in the simulations. As a result, it is possible to match shock speed and void behavior throughout MARBLE void collapse experiments — a series of separated reactant ICF experiments employing plastic foams with engineered macro-pores designed to investigate heterogeneous material mixing during spherical implosions to measure for the first time shock-bubble interactions in the HEDP regime.

By using University of Rochester's Laboratory for Laser Energetics' inline cross-beam energy transfer modeling, simulations were performed without any adjustable parameters. This is the first time scientists have demonstrated such remarkable agreement between simulation and experiment for cylindrical targets without using multipliers to improve agreement with experiments.

SCIENCE, TECHNOLOGY, AND ENGINEERING

Boundary of Heliosphere Mapped for the First Time

For the first time, Laboratory scientists have mapped the boundary of the heliosphere. Such a map gives

scientists a better understanding of how solar and interstellar winds interact.

"Physics models have theorized this boundary for years," said Dan Reisenfeld, a Laboratory scientist and lead author on a paper published in the *Astrophysical Journal*. "But this is the first time we've actually been able to measure it and make a three-dimensional map of it."

Reisenfeld and a team of researchers used data from NASA's Earth-orbiting Interstellar Boundary Explorer (IBEX) satellite, which detects particles that come from the heliosheath (the boundary layer between the solar system and interstellar space). The team mapped the edge of this zone — a region called the heliopause. Here, the solar wind, which pushes out toward interstellar space, collides with the interstellar wind, which pushes in toward the Sun.

To make this measurement, the team used a technique similar to how bats use sonar. "Just as bats send out sonar pulses in every direction and use the return signal to create a mental map of their surroundings, we used the Sun's solar wind, which goes out in all directions, to create a map of the heliosphere," explained Reisenfeld.

ChemCam's Laser is Back to Firing

In January 2021, the ChemCam instrument aboard the Mars Curiosity rover sent state-of-health data indicating that the high voltage (HV) required for firing the laser was not as stable as expected. ChemCam has been operating aboard Curiosity since the rover landed on Mars in 2012. The laser was still fired normally and the returned spectral data were normal, but laser operations on Mars were paused to investigate. During this time, ChemCam continued to obtain image and passive spectroscopy data.

In France, project leads for the laser populated a spare electronics board nearly identical to the one on Mars and spent several weeks testing various modes that might cause some instability. They found that the HV behavior was no risk to the rest of the instrument. The team then decided to test several laser operational modes on Mars to determine how best to restart laser operations.

Testing on Mars with ChemCam has shown that the HV remains relatively stable when the instrument is cool; the laser continues to fire normally and return excellent science data. Moving forward, the ChemCam team will continue the use of the laser, but will limit the total number of laser activities planned at a single time to maintain cooler instrument temperatures.

Grant Meadors Awarded APS 5 Sigma Physicist Award

Grant Meadors, a remote-sensing scientist in the Laboratory's Space Data Science & Systems group, has been honored with the American Physical Society (APS) 5 Sigma Physicist Award. Every year, APS recognizes a select group of APS members with the 5 Sigma Physicist Award, which recognizes "outstanding advocacy that is crucial to maintaining the strength of the scientific enterprise." One of 12 individuals honored this year, Meadors was recognized for his advocacy work on nuclear and social issues.

"We are so fortunate to have Grant Meadors at the Laboratory. His research in space weather is strategic in our mission, in both space exploration and global security," said Stephen Whittemore, Group Leader for Space Data Science & Systems. "He is a joy to work with and demonstrates the highest degree of professionalism. His advocacy is commendable and so critical to our work environment. Congratulations to Grant on this well-deserved honor."

During the 2020 legislative session, Meadors worked with APS leadership and Senator Heinrich's office on a funding bill related to the extension of New START (Strategic Arms Reduction Treaty), a nuclear arms reduction treaty between the United States and Russia.

Laboratory-Developed Stretchable Biosensors Could Make Tissue and Organ Surgery Safer

Laboratory scientists, in collaboration with researchers from Purdue University, have developed bio-inks for biosensors that could help localize critical regions in tissues and organs during surgical operations.

The new biosensors enable simultaneous recording and imaging of tissues and organs during surgical procedures. For example, simultaneous recording and imaging could be useful during heart surgery in localizing critical regions and guiding surgical interventions such as a procedure for restoring normal heart rhythms.

The Laboratory was responsible for formulating and synthesizing the bio-inks using 3D printing techniques. The goal was to create an ultra-soft, thin, and stretchable material for biosensors capable of seamlessly

interfacing with the surface of organs. The bio-inks are softer than tissue, stretch without experiencing sensor degradation, and have reliable natural adhesion to the wet surface of organs without needing additional adhesives. The research was published in *Nature Communications*.

Laboratory Teams Work with International Group to Examine Spread of Infectious Disease by Migratory Birds

A multinational effort is underway to understand and control the spread of disease among migratory birds. Called the Avian Zoonotic Disease Network, this efforts aims at detecting dangerous infectious diseases and pathogens of pandemic potential, such as avian influenza. The timing is fortuitous, given that in early June 2021, China announced the first known human case of H10N3 bird flu.

"Partnering with Michigan State University, CRDF Global, and researchers from Georgia, Jordan, and Ukraine, we'll have a multidisciplinary team working along what's known as the Mediterranean and Black Sea Flyway (MBSF), the main migration route for birds between Africa and Europe," said Jeanne Fair, a project partner from the Laboratory's Biosecurity and Public Health group and an expert in animal disease ecology and epidemiology.

The Avian Zoonotic Disease Network will be proactive in developing on-the-ground strategies and biosurveillance, Fair said. This work includes investigating the prevalence of pathogens in migratory birds, examining the host and environmental determinants of infections, and implementing protocols across the partner countries to expand research capacity.

New Integration of Cloud Technology with Laboratory High Performance Computing Systems Leads to More Streamlined, Productive Research Efforts

Through an ongoing collaboration between the Laboratory and Hewlett Packard Enterprise (HPE), researchers can now use the power of cloud technologies to conduct more efficiently complex scientific research using high performance computing (HPC) applications. These technologies enable administrators to upgrade and maintain computing systems without interrupting critical ongoing work.

By leveraging software containers and container orchestration in both user space and for system management, the Laboratory's latest Institutional HPC system, Chicoma, now provides hundreds of users with greater flexibility than was previously available on generation systems.

New Laboratory Instrument Helps Scientists Better Understand Charged-Particle Environments

Laboratory researchers and collaborators have developed a new miniaturized, rugged, and low-cost instrument that performs *in situ* measurements of ion or electron energy, as well as subsequent derived density, temperature, and spacecraft potential. This work was captured in a newly published study in the *Journal of Spacecraft and Rockets*.

Called the Energetic Electrostatic Analyzer, the instrument was developed as part of a concerted effort to create low-size, -weight, and -power (SWaP) plasma instruments that measure the charged-particle populations that exist in the terrestrial ionosphere and magnetosphere, as well as other planetary atmospheres.

"The primary driver behind developing low-SWaP instrumentation is to allow for the sensors to be mounted on CubeSats, which will allow for constellations of satellites to perform multipoint measurements and thus provide a significantly improved understanding of the complex and dynamic charged particle environments," said Carlos Maldonado, a Los Alamos researcher and lead author on the publication titled "The effects of spacecraft potential on ionospheric ion measurements."

Research Provides Data to a Suite of Novel Thermomechanical Models Under Development

In a paper published in *Nature Communications* ("Dislocation interactions in olivine control postseismic creep of the upper mantle"), a Laboratory team that included Ricardo Lebohnson of Fluid Dynamics and Solid Systems (T-3) reported evidence that dislocation structures and associated internal stresses in olivine — the dominant material of the Earth's upper mantle — are preserved after deformation at room temperature but

also at 1200°C. This deformation indicates that, contrary to previous assumptions, accumulation of stresses from dislocation structures should contribute to transient creep, even at such high temperatures.

Changes in stress applied to mantle rocks, such as those imposed by earthquakes, commonly induce a period of transient creep. Scientists have traditionally modeled these changes based on stress transfer among slip systems caused by grain interactions. However, these new results motivate and provide validation data to a suite of novel thermomechanical models under development at the Laboratory. These models can capture the observed intragranular processes.

Researchers will use these new models in geophysical applications to refine predictions of evolving mantle viscosity over earthquake cycles, as well as in material science applications to improve predictions of creep of metallic materials under extreme deformation conditions.

Three Laboratory Scientists Honored by American Nuclear Society

Two Laboratory scientists were named fellows of the American Nuclear Society (ANS), with a third recognized with a special award. Named fellows were Mark B. Chadwick, chief scientist and chief operating officer of Weapons Physics, and Stuart A. Maloy, deputy group leader for Materials Science at Radiation and Dynamic Extremes. D. V. Rao, program director for the Laboratory's Civilian Nuclear Program, earned a special award for making advanced nuclear energy systems a reality.

Chadwick was named an ANS Fellow for his renowned contributions to modeling of plutonium fission and his leadership in nuclear cross-section evaluations, which have led to improved simulation performance across a variety of nuclear applications. Chadwick's international leadership in nuclear science and technology, as well as his significant and continuing technical contributions to the nuclear enterprise, were also recognized by the society. He was awarded DOE's E.O. Lawrence Award in 2011 for his analysis of fission product yields and their energy dependencies, which resolved a long-standing discrepancy in nuclear yield assessments.

Maloy was named an ANS Fellow in recognition of his outstanding accomplishments and leadership in radiation materials science and engineering, as well as his expertise in microstructural analysis and interpretation. ANS noted that Maloy's expertise in microstructural analysis underpins the development of innovative materials needed for spallation neutron sources, advanced fission and fusion reactors, and other energy applications.

Rao's work focuses on advancing small-reactor deployment opportunities by designing new space reactors, microreactors, and moderating material for low-enriched uranium fuel. His office oversees research and development performed in support of the Energy Department's Office of Nuclear Energy, NASA (Radioisotope Thermoelectric Generators and Fission Power Systems), and the U.S. Nuclear Regulatory Commission.

MISSION OPERATIONS

Bahran Honored with Secretary of Defense Medal for Exceptional Service

A Laboratory scientist on assignment to Washington, D.C., Rian Bahran has received the Secretary of Defense Medal for Exceptional Public Service for his exemplary performance. Bahran was recognized for his service and contributions as (1) a senior science and policy adviser for nuclear deterrence policy (January 2019 to May 2020), and (2) as a special assistant to the Under Secretary of Defense for Policy (May 2020 to June 2021).

"Dr. Bahran performed with distinction during a period in which the Department of Defense implemented outcomes of the Nuclear Posture review," the citation reads. Among his duties, Bahran oversaw the implementation of the Nuclear Posture Review, which establishes nuclear policy, strategy, capabilities, and force posture.

Bahran also led various national and international forums related to the technical aspects of U.S. extended deterrence to NATO, and he served as the Department of Defense policy lead for the successful negotiation of a nuclear accident-incident agreement. The U.S. government relied on his technical insights and policy support related to arms control, nonproliferation, nuclear testing, and strategic stability dialogues.

During a crisis in the Middle East, Bahran, a bilingual Yemeni-American, was called to apply his language and regional experience to support the Under Secretary of Defense for Policy and the Secretary of Defense.

Campaign Storage System Rebuilt

Thanks to a collaboration between High Performance Computing (HPC) Design, HPC-Systems, and HPC-Environments, the secure Campaign Storage system, along with Redcap, has been completely rebuilt using existing hardware, but installing an entirely new software stack. Replacing the software in aging disk drives, the new stack increases software resiliency that ensures user data are not lost.

The collaborators moved multiple petabytes of data off Campaign Storage, rebuilding this infrastructure with software capable of achieving much better redundancy, data integrity/availability, and security. User data were then moved back onto Campaign Storage. No user data were lost during these efforts, a strong testament of the Laboratory's implementation of the underlying erasure coding technology. The collaborators worked together to facilitate a smooth cleanup, reformat, and reintroduction to production work with minimal downtime.

Craft Employees Recognized for Safety Efforts

The Laboratory continues to prioritize safety efforts, thanks to vigilant craft employees, some of whom successfully applied principles associated with Safe Conduct of Research (SCoR). Despite its name, SCoR does not pertain only to safety or to people conducting research — its eight principles are designed to help everyone perform work more effectively. Here are some examples of how craft employees ensured the safety of others at the Laboratory:

- Two Craft Pipefitters paused excavation activities when they smelled gas. Once operations were paused, the pipefitters contacted a Utility Gas crew to investigate the cause of the odor. The crew discovered a gas leak that had created elevated concentrations of gas in the area. In this case, something did not "smell right" and both employees practiced the "questioning attitude" SCoR principle by pausing work to keep everyone safe.
- An employee noticed what he felt was an unsafe configuration of steel pipes stacked above their safety stops/pins. The employee noticed that the pipes were secured only by two tether lines, making it possible for the pipes to break free, fall, and likely result in severe injuries to employees and equipment. This employee was recognized for his use of SCoR principles to prevent an injury from occurring.
- Three employees assigned to a building upgrade project were recognized for supporting the Laboratory's safety initiatives. The project includes asbestos abatement, as well as reinsulating and installing aluminum jacketing of the steam pits, all of which will ensure a safe work environment for LANL employees who perform duties in that facility once the upgrades are complete.
- A project superintendent was recognized for exceptional customer service and work as a key member of the Sigma Strive for Excellence Team. This employee led colleagues in a focused effort to use Human Performance Improvement (HPI) tools to assist in the overall reduction of incidents and injuries on multiple projects underway in a secure research facility.
- A craft employee was recognized for displaying the SCoR principle of a questioning attitude regarding vehicle training for craft personnel. This employee identified the need for drivers using certain work vehicles to complete the UTV/Side-by-Side training course so that they could be cleared to safely use such vehicles.

Collaborators Develop Method to Auto-Populate the Mobile Numbers of Workers into the Laboratory Directory

In collaboration with Network Infrastructure Engineering (NIE) and Software Applications Engineering (SAE), Human Resources (HR) at the Laboratory developed a process that auto-populates employee mobile numbers into the Laboratory's directory.

Previously, when an employee was issued a LANL mobile phone, that phone number was not auto-populated into the Laboratory's Oracle phone directory. Instead, employees were encouraged to enter the number manually. As teleworking became the norm, reaching employees via mobile phone became a challenge, if the employee failed to enter that phone number into the Lab's directory.

To address this challenge, the collaborators made the following corrections:

- Scrubbed Oracle manually for missing data.

- Relabeled the mobile device fields in Oracle for greater clarity to the end user.
- Sent an all-employee news article with instructions that asked employees to properly list any of their phone numbers (including mobile numbers) into Oracle.
- Built a systems solution that automatically feeds new Laboratory mobile-phone numbers into the phone directory

All components have been fully implemented.

Facilities and Operations Divisions Work Together to Fix Valve at Steam Plant Serving TA-03 Campus

At the TA-03-0022 Steam Power Plant, personnel identified a steam leak on the flange of a stop valve. But it turned out that this was not just any stop valve—this one is on the common header, which supplies steam to the entire TA-03 campus.

Repairing this valve would require a steam outage of TA-03 and associated facilities. The affected facilities were notified, and the system was brought down on June 11, 2021.

The collaborative efforts of the Maintenance Site Services, Utilities and Infrastructure, and Logistics divisions were critical in making repairs. With support from riggers, pipefitters removed the valve, discovering that the flange's exterior was scarred. The pipefitters prepped and repaired the flange and reinstalled the valve.

Glenn Martinez (Logistics Superintendent for Field Work Execution) coordinated the effort, with support from Utilities and Infrastructure group members in Engineering and Operations, Materials and Site Services, LOG-Pipefitters, and the Field Engineering group. About 45 pipefitters assisted to safely reintroduce steam back into the system.

"Get Vaccinated, Get $100" Campaign Shared Throughout the Laboratory

The State of New Mexico is offering a $100 incentive to anyone in the state who received a Johnson & Johnson Janssen vaccine shot or Moderna or Pfizer booster shot between June 14 and 17. The New Mexico Department of Health announced this campaign on Monday, June 14, 2021.

On June 15, 2021, the Laboratory's Public Affairs group shared this information with all Laboratory employees through the internal homepage. Public Affairs also created a large, colorful flyer for posting throughout the Laboratory, particularly in areas frequented or populated by craft employees. Personnel from the Logistics Division hung 100 flyers throughout the Laboratory campus the second afternoon of the campaign.

The flyer outlined the steps that individuals must follow to qualify for the $100 incentive, including the option to register for a vaccine onsite through the Laboratory's getvaccinated@lanl.gov email. Clearly noted on the flyer was the stipulation that the incentive is not affiliated with Triad National Security, LLC. Furthermore, the Laboratory will not register individuals for the incentive if they receive a vaccine onsite. Instead, each employee is responsible for individual registration on the New Mexico Department of Health website.

Laboratory Director Thom Mason Holds Town Hall with DOE Secretary Granholm

Laboratory Director Thom Mason held a Town Hall meeting for all employees (watch a video of this event). At this meeting, Mason answered questions about vaccines, research priorities, teleworking, and more. U.S. Secretary of Energy Jennifer Granholm made a guest appearance, where she thanked Laboratory staff for their contributions to DOE's missions. Some key timestamps on the video are as follows:

- At 4:40, Mason explains the Laboratory's progress in vaccinating employees.
- At 9:29, learn about the Lab's teleworking posture and plans to return to "100% effectiveness."
- At 21:00, learn about new bills, FY22 Appropriations, and new leadership in Washington, D.C. and the local NNSA Field Office.
- At 34:45, the DOE Secretary discusses the Laboratory's mission.
- At 44:30, the DOE Secretary answers employee questions.
- At 51:00, hear Mason's impression of the Laboratory's plutonium pit mission and the effort to stand up the Associate Laboratory Directorate for Plutonium Infrastructure.

- At 57:18, Mason provides updates on ST&E, operations, and community relations.

Laboratory's Business Management Directorate Opens Renovated Collaborative Workspace

At the end of May 2021, the Laboratory's Business Management Directorate formally announced the opening of a fully renovated, shared, drop-in workspace for its teleworking employees. The new space, known as Central Park Square (CPS), is located in Los Alamos and provides the following:

- collaboration space,
- physical meeting rooms,
- shared or single-use workspaces,
- office supplies, and
- printing and shredding capabilities.

The space is built to maximize efficiency for teleworkers who on occasion must physically report to the Laboratory's main campus. Employees can reserve drop-in space, single-user space, and meeting/collaboration space as needed to maximize their day.

On May 27, 2021, employees were notified that the space is open. Employees received guidance on how to use the space and were briefed on building security procedures, safety expectations, COVID-19 precautions, and ergonomics. A new CPS resource website will facilitate the scheduling of meeting rooms and will provide details associated with the use of the space.

Laboratory's Finance Division Creates Finance Career Manual to Aid in Staff Development

A team of financial analysts across the Laboratory's Finance Division (Operations; Science, Technology and Engineering; Weapons Program) collaborated to develop a shared Finance Career Manual for staff member development.

This Finance Career Manual within the OneNote application enables both new and experienced employees to brush up on the basics of the Finance Division. The manual outlines various terminology, processes, and procedures, including the following types of information:

- definitions of project codes,
- logic behind project codes relative to funding,
- processes for cost transfer requests,
- journal upload processes, and
- accrual processes.

The Finance Division has hired more than 10 new employees within the last several months and will use the Finance Career Manual to onboard and mentor staff.

Laboratory Launches "World-Class Institution" Website to Share Vision with Community

Titled "roadmap for a world-class institution: smart and sustainable growth for our mission, workforce, and community," the Laboratory's latest external website made its debut on June 23, 2021. Featuring the Lab's signature brand, this website invites online visitors to learn about the Laboratory's vision for sustainable growth to support all Department of Energy's missions: national security, science, energy, and environmental stewardship.

Website visitors are immersed in the Laboratory's bold and instantly recognizable brand as they experience the Laboratory's transformation to embrace a new world. Visitors gain a greater understanding into how the Laboratory's environmental stewardship drives action. Website guests also gain insight into the Laboratory's approach to strategic growth: a strong construction foundation grounded in safety and security enables scientific initiatives.

This journey showcases the Laboratory's success in transitioning thousands of employees to a work-from-home model to keep them safe, and the site spotlights the 21st-century thinking at the Laboratory. The website was developed by Communications Arts and Services and Public Affairs.

LOMA Graduates 49 Leaders from ALDFO in May

Workshops for the Laboratory Operations Management Academy (LOMA) for leadership and culture development were held on May 4 and May 5, 2021. Following COVID-19 protocols, these workshops were held during morning hours at the Physics Auditorium and at the White Rock Training Center during afternoon hours.

LOMA helps higher-level managers (5 and 6) better understand and support the efforts of their first-line managers to (1) enact Safe Conduct of Research (SCoR)

principles, and (2) pass such principles down to the work-team level. Before these sessions, the Associate Laboratory Directorate for Facilities & Operations (ALDFO) hosted LOMA classes in August 2020 at the White Rock Training Center (these classes also adhered to COVID-19 protocols). Since LANL started LOMA, 126 leaders in ALDFO have participated.

Lujan and Fernandez Visit the Laboratory

The Laboratory this month, June 2021, hosted two newly elected members of the New Mexico congressional delegation for tours and briefings on the weapons program and climate and energy research, among other topics.

Senator Ben Ray Luján's visit on June 3, 2021, focused on how the Laboratory's research relates to the U.S. Innovation and Competition Act, which has passed the U.S. Senate and is now waiting for a vote in the U.S. House. Luján, who served in the House before being elected to the Senate in November 2020, added an amendment to the bill that would invest $17 billion in LANL and the other Department of Energy facilities. During his visit, Luján learned more about the Laboratory's expanding earth systems research, its contributions to reducing the carbon dioxide footprint in the Intermountain West, and regional technology advancements.

Congresswoman Teresa Leger Fernandez's June 4, 2021, visit to the Laboratory was her first-ever. Director Thom Mason greeted her and gave her an overview of the Laboratory's work. Leger Fernandez, who is serving her first term representing Northern New Mexico in the U.S. House, also received introductory briefings on the Laboratory's weapons, intelligence, global security, and climate and energy research.

New Diversity, Inclusion, and Equity Efforts in EES Division

The Earth and Environmental Sciences (EES) Division has formed a new grass-roots committee called "Geoscientists United for Inclusion, Diversity, and Equity," or GUIDE. The mission of this committee is to ". . . work with the EES-DO, management, and staff to promote diversity, equity, and inclusion and to support the development of a multicultural workforce that attracts and retains the most qualified people at EES." GUIDE seeks to provide resources to EES employees to help them create a more inclusive, diverse, and equitable workplace."

GUIDE's intent is to provide regular diversity shares that highlight ongoing activities and available resources, highlight relevant literature on diversity in geosciences/STEM, provide job ad templates for new hires in EES that use inclusive language, and maintain databases of minority serving institutions. GUIDE has already

New Telework Hub Space Opens Onsite

Employees who have been teleworking for the past year will now have a place to work onsite, thanks to the newly renovated and repurposed offices and meeting spaces at the Laboratory's Otowi Building. Personnel have remodeled and refitted the first and second floors of Otowi to accommodate up to 1,300 workers. Employees will use an online reservation system to access some of the renovated areas, whereas other areas are available first-come, first-served.

The result of a major renovation effort led by the Infrastructure Programs Office, these new "telework hub" spaces include advanced workstations, ergonomic tables, chairs and computer monitors, whiteboards, and comfortable sofas and cushioned work pods. If privacy is needed, FrameryTM pods — a modern twist on old-school phone booths — are plentiful throughout both floors.

Although some spaces in the newly configured areas are dedicated to specific groups, other areas are open to all employees, regardless if they have been teleworking or not. Any employee with a Z# can use this "institutional" space.

Groups with dedicated space are as follows:

- Payroll — first floor
- Science Program Office — first floor
- ALDX (Weapons Physics) Students — first floor
- Earth and Environmental Sciences — first floor
- ALDCP (Capital Projects) — second floor
- Institutional Quality and Performance Assurance — second floor
- ALDFO (Facilities and Operations) — second floor
- Policy Management Office (PMO) — second floor

Employees not associated with the above groups are welcome and encouraged to use the institutional space available throughout Otowi.

Planned Major Maintenance has Spent $5.7 Million in FY21 to replace Old Equipment

The Laboratory's Facilities and Operations Directorate (ALDFO) is replacing and refurbishing old equipment by taking advantage of available Planned Major Maintenance (PMM) funds. The directorate is replacing systems at the end of their lifetime with new equipment, with the goal of ensuring that such refurbished facilities and systems provide an improved working environment for customers. This fiscal year, ALDFO allocated increased funds of $12 million for facility improvement Laboratory-wide. As of the end of May 2021, the directorate has spent $5.7 million.

An example of one such project consisted of improvements made at the Lab Data Communications Center (LDCC). Maintenance personnel from the Institutional Facilities Division, with support from construction craft based in Logistics, recently completed an upgrade of the heating and hot-water system at the LDCC, which is located at TA-53's Building 1498. Improvements include a new piping configurations, isolation valves, controls, electrical disconnects, and an expansion tank, all of which were installed to upgrade the hot-water side of the heating system. The system also was reconfigured to enable easier and more efficient maintenance of the equipment. In FY22, personnel will upgrade the steam side of the system.

Secretary of Energy Granholm Pays Virtual Visit to the Laboratory

On June 14, 2021, U.S. Secretary of Energy Jennifer M. Granholm learned about Laboratory programs that support DOE's mission — including plutonium operations, nonproliferation, supercomputing, climate and energy solutions, and Mars exploration — during a virtual "visit" to the Lab.

About 200 vaccinated employees gathered in the National Security Sciences Building's (NSSB) auditorium to watch Granholm's visit, which consisted of a combination of video "tours" of facilities and live interaction with Laboratory leaders and researchers. The setup allowed Granholm, who participated from Washington, D.C., to see what was happening on stage while the audience in the NSSB watched her on a big screen.

Granholm's first stop was a video visit to the Plutonium Facility (PF-4), followed by a live conversation with Lab employees about the Lab's plutonium research and manufacturing capabilities and the science that it enables. Altogether, she was able to see and discuss the New Employee Training Academy, the Los Alamos Neutron Science Center, and LANL's world-renowned supercomputers. After the final video, she talked with researchers who are using computer modeling to better understand and address climate change and related issues, such as wildfire patterns.

Granholm set an easygoing tone, joking and expressing her support for the Laboratory's important science and research. Employees reciprocated, thanking Granholm for the time she took to listen and learn about the Laboratory's national security and other missions and encouraging her to visit in person.

Wildfire Mitigation Efforts Improve Health and Safety of Laboratory Forests

To minimize wildfire potential and improve the overall health of forests on Laboratory property, workers have

- removed 3,500 trees from the blowdown event of 2019,
- thinned almost 1,000 acres of forest land,
- improved 52 miles of fire roads and 13 miles of fire breaks, and
- masticated 4,000 acres of undergrowth since 2010, a process that to date has yielded 300 cords of firewood to the Four Accord Pueblos.

Workers cleared roadside safety zones (60 feet wide) on 67 miles of evacuation routes. The Emergency Management Department also completed a Site-wide Risk Assessment to help prioritize mitigation efforts on its 37-square-mile area of responsibility. All these efforts were undertaken with the support of the Laboratory's Cultural Resources and Environmental Protection and Compliance groups to ensure that these efforts respect the region's unique history and protect threatened species.

COMMUNITY RELATIONS

Laboratory Helps Teams from Across the Region and the World to Take Part in Virtual Robotics Event

Thanks to the COVID-19 pandemic, the twelfth year of the Laboratory's involvement in the RoboRave robotics event has been nothing like previous years. Nevertheless, both the nonprofit Inquiry Facilitators (based in New Mexico) and Janelle Vigil-Maestas from the Laboratory's Community Partnerships Office crafted an engaging online learning experience for 149 student teams from across northern New Mexico and from around the world.

Using the RoboSensei online platform, students from first through twelfth grades have been designing and programming their own virtual robots to compete in a range of activities from May 7 through July 15, 2021. Teachers can work with their students on age-appropriate challenges that teach programming skills.

One unexpected benefit of having the event take place virtually is that the teams from northern New Mexico (these make up the majority of the participants) have had the chance to interact with the small number of international teams taking part, from countries such as Mexico and Argentina. Support for the northern New Mexico teams came from sponsorship by Laboratory operator Triad National Security, LLC.

Laboratory Launches New Discover Website Available to Everyone

The Laboratory recently launched Discover, a new external website that showcases news, publications, podcasts, and videos. A continuation of ongoing rebrand initiative, Discover serves as a channel for the Laboratory's latest and greatest content, presented through a variety of communications platforms, to help tell the Lab's full story.

The Discover site provides visitors with a full and rich experience that illustrates who we are and what we do at the Laboratory. Content can be viewed by strategic initiative — Nuclear Security, Mission-Focused ST&E, Mission Operations, and Community Relations — aligning external messaging to the areas of the Lab Agenda. Discover content is responsive and accessible across platforms and devices (i.e., laptops, phones, and tablets). Digitally optimizing and interrelating Laboratory content yields practical value by improving SEO (search-engine optimization) and ultimately boosting traffic, engagement, and recruitment.

Mystery Book for Kids Features Laboratory Scientist as Character

In *The Case of the COVID Crisis*, mathematical epidemiologist Sara Del Valle (Information Systems and Modeling, A-1) helps two teen protagonists on their journey to become data detectives and understand health disparities during the pandemic. With support from the National Science Foundation (NSF), disadvantaged students in hands-on Data Detectives clubs are using this book to understand epidemiology concepts and meet real people who use data in their careers.

Del Valle was an advisor to the NSF project, COVID-Inspired Data Science Education through Epidemiology (CIDSEE), which put together the hands-on Data Detectives club. Author Pendred "Penny" Noyce holds a biochemistry degree from Harvard University and a medical doctorate degree from Stanford University.

Partnership with University of New Mexico Creates New Mechanical Engineering Program

The Laboratory, the University of New Mexico-Los Alamos (UNM-LA), and the UNM School of Engineering have collaborated to expand an existing two-year pre-engineering program into to a Bachelor of Science in Mechanical Engineering (BSME) program at the UNM-LA campus. The program was developed to meet identified workforce needs at the Laboratory, but it will also provide local students new learning opportunities.

On June 7, 2021, the collaboration was marked at a celebration at UNM-LA, attended by Laboratory Director Thom Mason; Garnett Stokes, UNM president; New Mexico Secretary of Higher Education Stephanie Rodriguez; James Holloway, provost and executive vice president for Academic Affairs at UNM; and Cynthia Rooney, chancellor of UNM-LA.

A pilot program began last year, with the Laboratory's Partnerships and Pipeline Office and Community Partnerships Office working with UNM-LA and the UNM-School of Engineering.

Virtual Festival Boosts the Math Confidence of Middle-School Students

With the help of the Laboratory's Community Partnerships Office, nearly 200 students from Carlos Vigil Middle School in Española gathered at school and from home on May 13, 2021, to take part in a range of fun activities to boost math confidence and refresh skills after a disrupted year. Together with longtime partner nonprofit STEM Santa Fe, the Laboratory organized a virtual Julia Robinson Math Festival (JRMF) staffed by 22 Laboratory volunteers. These volunteers helped students try a selection of engaging puzzles and challenges.

The push for the Festival came via Astrid Morreale (P-3), a Laboratory volunteer who had been mentoring a seventh-grade student at the school and noticed that the students would benefit from a chance to reconnect with math following the challenges of the COVID-19 pandemic. The event came together in partnership with Carlos Vigil's teachers and administrators, as well as Simon Miera, the school district's Gear Up coordinator. Gear Up is a federally funded state initiative to increase the number of low-income students that obtain a secondary-school diploma and thus prepare them to succeed in postsecondary education.

SELECTED MEDIA COVERAGE

Big Development on the Nuclear Horizon
Albuquerque Journal (5/26)
As part of efforts to ramp up the upgrade of the U.S. nuclear arsenal, LANL, along with the Savannah River Site in South Carolina, have been tasked with manufacturing hundreds of plutonium pits, the element within the core of a nuclear warhead that sets off the explosion.

Quasicrystal Formed During First Nuclear Explosion in New Mexico
KOB TV (5/26)
A newly discovered quasicrystal is believed to have been created by the first nuclear explosion in New Mexico in 1945.

LANL Foundation Launches 2021 Bright Futures Fundraising Campaign
Los Alamos Reporter (5/27)
The Los Alamos National Laboratory (LANL) Foundation is pleased to announce the launch of its 2021 Bright Futures Fundraising Campaign, with the goal of raising $100,000 additional dollars for its scholarship program.

DNA: The Ultimate Data-Storage Solution
Scientific American (5/28)
DNA storage technology exists today, but to make it viable, researchers have to clear a few daunting technological hurdles around integrating different technologies. As part of a major collaboration to do that work, our team at Los Alamos National Laboratory has developed a key enabling technology for molecular storage.

Spin-Ice: Breakthrough in 3D Magnetic Nanostructures Could Transform Modern-Day Computing
SciTech Daily (5/31)
In a new study published today in *Nature Communications*, a team led by scientists at Cardiff University have created the first-ever 3D replica of a spin-ice material using a sophisticated type of 3D printing and processing. The study was led by Cardiff University and included researchers from the Los Alamos National Laboratory.

LANL's Centrifuge Test Facility Adds Key Capability
Los Alamos Reporter (6/2)
Part of the stockpile stewardship mission at Los Alamos National Laboratory is assuring that the weapons will work as designed throughout the "stockpile to target sequence" that includes the flight component. In order to fulfill this mission, the Laboratory conducts a wide variety of tests at its Centrifuge Test Facility (CTF), a one-of-a-kind capability that can create high-gravity environments like those encountered during missile launch and atmospheric re-entry, for example.

Sen. Luján Tours Los Alamos and Sandia National Labs, Highlights Need to Pass U.S. Innovation & Competition Act
Los Alamos Daily Post (6/2)
U.S. Sen. Ben Ray Luján toured Los Alamos National Laboratory and Sandia National Laboratories and met with Lab leaders to discuss the importance of passing the U.S. Innovation and Competition Act.

Competition and Collaboration: Understanding Interacting Epidemics can Unlock Better Disease Forecasts
Discover Magazine (6/3)
The new algorithm, developed at Los Alamos National Laboratory in collaboration with colleagues from Queen Mary University of London and Aston University in the U.K., accurately forecasts interacting epidemics on structured networks without massive computer simulations. The method uses insights from network methods developed in computer science and statistical

physics, carefully exploits the structure of interacting forces, and provides an accurate analytical forecast in a time comparable to a single simulation run.

Messages Scrambled by Black Holes Stand Their Ground Against Quantum Computers
Physics World (6/4)
In a paper published in *Physical Review Letters*, researchers at Los Alamos National Laboratory in the US show that once a message has been scrambled by a black hole or another system with similar properties, not even a quantum computer can put it back together.

National Labs Could Get Boost from Bill
Albuquerque Journal (6/6)
Luján was briefed at LANL about climate change research and how the lab is working to improve carbon capture technology. "History has shown that investing in U.S. innovation means economic growth and strategic advantages in security," LANL Director Thom Mason said.

Los Alamos Scientists Miles Beaux and Matt Durham Earn Department of Energy Early Career Awards
Los Alamos Reporter (6/7)
Two Los Alamos scientists, Miles Beaux and Matt Durham, are among 83 scientists who will receive a total of $100 million through the Department of Energy's Early Career Awards Program, which supports critical research at universities and national laboratories.

Why Arctic Soil Can Go Slip-Sliding Away
Phys.org (6/7)
Slow-moving arctic soils form patterns that, from a distance, resemble those found in common fluids such as drips in paint and birthday cake icing. Los Alamos researchers and their collaborators analyzed existing arctic soil formations and compared them to viscous fluids, determining that there is a physical explanation for this pattern that is common to both Earth and Mars landscapes.

Collaboration between UNM-LA and LANL Leads to Creation of Bachelor of Science in Mechanical Engineering Program
Los Alamos Daily Post (6/10)
The University of New Mexico-Los Alamos (UNM-LA) campus along with representatives from the University of New Mexico and Los Alamos National Laboratory announced that UNM-LA is offering a Bachelor of Science degree in mechanical engineering. The extension of the existing two-year pre-engineering program was made possible through a collaboration between UNM-LA and LANL.

National Laboratories Helping Local Businesses
KOB (6/10)
The technology readiness gross receipts tax credit (TRGR) initiative connects scientists and engineers at Los Alamos or Sandia National Laboratories to businesses. The goal of TRGR is to help projects along through the commercialization process.

LANL Foundation Awards $56,250 in Student Scholarships
Los Alamos Daily Post (6/11)
Los Alamos National Laboratory (LANL) Foundation, in partnership with the Los Alamos Employees' Scholarship Fund (LAESF), has announced its 2021 Fall term Career Pathways Scholarship recipients.

At Last, Maybe More Money for Cleanup Work at LANL
Albuquerque Journal (6/13)
The immense size of the job of environmental remediation at Los Alamos can be measured by the years projected to complete the work. The latest federal budget plan calls for spending up to $8.4 billion, possibly through 2090.

Los Alamos Lab Aids Efforts to Boost Plastic Recycling
Santa Fe New Mexican (6/13)
Los Alamos National Laboratory is part of a consortium developing a technology to rapidly break down discarded plastic at the molecular level into components that can be used to create other materials, such as nylon.

Los Alamos in R&D Pact with Quantum Computing Inc. for Exascale and Petascale Simulations
Inside HPC (6/14)
Quantum Computing Inc., a Leesburg, VA-based company focused on bridging classical and quantum computing, today announced a three-year cooperative research and development agreement with Los Alamos National Laboratory.

Los Alamos National Lab Studies Smoke from Western Fires
KOB TV (6/14)
Scientists at Los Alamos National Lab studied smoke from Arizona and southwest New Mexico to see how the smoke affects the public and the climate.

Three New Mexicans to Know Who Are Rockstars
Albuquerque Business First (6/14)
Miles Beaux and Matt Durham just joined a pretty elite group. Scientists from Los Alamos National Laboratory, the pair was part of a group of 83 scientists who — in total — are set to receive $100 million through the

Department of Energy's (DOE) Early Career Research Program.

What Are Imaginary Numbers?
HowStuffWorks (6/14)
Complex numbers with imaginary components also are useful in theoretical physics, explains Rolando Somma, a physicist who works in quantum computing algorithms at Los Alamos National Laboratory.

The Delta Variant Could Create "Two Americas" of COVID, Experts Warn
BuzzFeed News (6/17)
In the US, a larger number of competing variants are circulating, making it harder to predict what will happen, Bette Korber, a computational biologist at the Los Alamos National Laboratory in New Mexico, told BuzzFeed News.

The Edge of Our Solar System Has Been Found: 'Bat-Sense' Used to Find 'Bubble' All Around Us
Forbes (6/17)
"Physics models have theorized this boundary for years," said Dan Reisenfeld, scientist at Los Alamos National Laboratory and lead author on a paper published in the *Astrophysical Journal* this week. Also reported in Taos News.

New Bio-Inks for Biosensors Could Make Surgery Safer
Los Alamos Daily Post (6/17)
A research team from Los Alamos National Laboratory and Purdue University have developed bio-inks for biosensors that could help localize critical regions in tissues and organs during surgical operations. Also reported in News Medical, Science Daily, and others.

Particles from Deep Space Could be Used to Fight Covid-19
Inverse (6/19)
A new Los Alamos-led study suggests that the Universe's naturally occurring radiation could be used in medical imaging and could be particularly useful when it comes to Covid-19.